

Theodore Roosevelt

National Park
North Dakota

National Park Service
U.S. Department of the Interior

Coal Vein Trail

“I grow very fond of this place, and it certainly has a desolate, grim beauty of its own, that has a curious fascination for me.”

. . . Theodore Roosevelt

THE TRAIL

The Coal Vein Trail is a 0.8-mile loop with numbered stops that correspond with the text in this leaflet. The loop can be shortened 0.2 mile by taking the shortcut path between stops 3 & 4 and 10 & 11. The route is fairly level, but with a **few** moderately **steep hills** and **several sets of steps**, it is not wheelchair accessible. Be alert for prairie rattlesnakes and prepared for midday summer temperatures that can exceed 100° F.

1. BURNING COAL

Prominent throughout the badlands are layers of brick-red rock, locally called “scoria” but more properly termed clinker. True scoria, a dark, cinderlike lava, is not found in this region, which has never been volcanically active. Not so obvious are the bands of black lignite coal. The two materials are related. As far back as 9,000 years ago, exposed coal periodically caught fire, occasionally burning for decades. The heat from these fires baked the overlying rocks, reddening them and making them harder. The effects of a fire that burned here for 26 years (1951-1977) can be seen along this trail.

2. LAND COLLAPSE

The shallow depression before you formed when the coal below the ground burned away. Unsupported surface rocks slowly collapsed into the space created by the burning coal. At one time the land was level with the top step.

3. BENTONITE

The thick grayish-blue layer on the hillside is bentonite. It too was formed by fire—but not by burning coal. Fifty-five million years ago, volcanoes spawned by the emerging Rocky Mountains spewed ash over a large area that included present-day western North Dakota. Time, heat and the pressure of burial under additional sediments transformed the ash into clay. It can absorb several times its volume in water and becomes very slippery when wet. It is used in over 1,000 products including candy bars, milkshakes and toothpaste. The scattered water-formed “pipes” or holes in the bentonite make excellent homes for black widow spiders. Keep curious hands away!

AHEAD, MAIN TRAIL CONTINUES TO LEFT AT JUNCTION. BEAR RIGHT TO TAKE THE MORE LEVEL SHORT LOOP TRAIL.

4. VEGETATION

This bowl-like depression collects rainwater. The water permits plants such as creeping juniper (**Juniperus horizontalis**) and shrubby cinquefoil (**Potentilla fruticosa**) to flourish. The amount of water, where it collects, and the amount of evaporation all influence vegetation. Through their root systems, the vegetation stabilizes the soil below. Vegetation is the key component in controlling erosion in the badlands.

5. JUNIPERS

You can find three species of junipers growing in the park. Here you see the juniper in its tree form, the Rocky Mountain juniper (**J. scopulorum**). A shrub-like form, dwarf juniper (**J. communis**) grows here as well, along with the creeping juniper. Native Americans ground juniper seeds for flour and made a tea by steeping the needles in boiling water.

6. SEASONAL POND

Water draining from the nearby ravine fills the depression in front of you. Seasonal ponds are critical to many insects and amphibians in the badlands who require water for reproduction. Slithering through the waving stand of foxtail barley (**Hordeum jubatum**) ringing the pond, the bullsnake (**Pituophis melanoleucus**) preys on toads and frogs and other unsuspecting small animals.
7. BURNOUT

The coal seam fire finally ended, under the hillside ahead and to your right. When this coal seam was burning, visitors could see flames and glowing embers. Some people even roasted marshmallows! About halfway up the hill is another seam, similar to the one that burned but much thinner.
8. OVERLOOK

Walk along the path to the left, to the edge of the hill. CAREFUL: THE EDGE DROPS OFF SHARPLY. Notice the junipers on the slope facing you. Junipers, which can't survive on the hot, dry, south-facing hillsides, flourish in the cooler, moist environment of north-facing slopes.
9. LICHENS

What appear to be paint spots on the clinker near the post are actually lichens (pronounced li' kens). Lichens consist of two different kinds of plants—fungus and alga—which live together in a closely balanced relationship. The algae produce food for themselves and the fungi, while the fungi obtain and hold water for the organism. Lichens help break down rocks into soil. They also absorb minerals easily and are susceptible to contamination by heavy metals and fluoride. Their sensitivity to impurities makes them excellent indicators of air quality. Park lichens have been studied to detect possible air pollution from area industries.
10. FORECAST: COOL

Notice the change in temperature and humidity as you enter the juniper-covered slope. Higher moisture levels in areas such as this create an environment in which many species of plants thrive. Look for the broad, fine-toothed leaves of choke cherry (**Prunus virginianus**), the tri-lobed leaves of skunkbush sumac (**Rhus aromatica**), and the delicate prickly stems of Wood's rose (**Rosa woodsii**). Look for signs of wildlife, including mule deer (**Odocoileus hemionus**), that enjoy the shade and protective cover.

BE CAREFUL DESCENDING THE STEPS AND CROSSING THE BRIDGE AT THE BOTTOM OF THE COULEE.

MAIN TRAIL CONTINUES TO LEFT AT TRAIL JUNCTION.
11. FIRE ORIGIN

The 1951 coal seam fire started near this spot. Burning coal seams are a natural process in the badlands. They still catch fire from time to time. Spontaneous combustion, range fires and lightning are the usual causes.
12. SCORIA

Walk up the path to the edge of the hill. CAREFUL: THE EDGE DROPS OFF SHARPLY. Reddish "scoria" tops the ridges here. Its color results from the baking process, which oxidizes iron present in various mineral compounds in the rocks. This natural brick resists erosion better than the softer claystones and siltstones, and it forms a protective cap. A deep canyon is forming where these softer layers are cut away by the creek below.
13. SLUMPING

Can you explain why this hill has the appearance of sliding? The carpet of lignite coal underfoot suggests the answer. Burning underground coal seams weaken a hill's structure, resulting in large surface cracks. Rainwater, soaking deep into the clay-rich soils, makes them swell and weaken further, to a point where the saturated sediments sag or flow downhill.
14. GRASSLANDS

Once the fires went out, native species again reclaimed the area. The 15 inches of annual precipitation sustains grasses such as western wheatgrass (**Agropyron smithii**) and needle-and-thread (**Stipa comata**), typical of the mixed grass prairie. Scattered clumps of prickly pear cactus (**Opuntia polyacantha**) remind us how dry the badlands really are. Nonnative plants such as the greenish-yellow leafy spurge (**Euphorbia esula**) also make their presence felt by causing ecological disruptions.
15. CRACKS

Cracks along the edges of the depression show that the area is still slowly sinking into the cavity formed when the coal seam burned away.
16. CLINKER

Small pieces of "scoria" were cemented together by exceptionally high heat to form this large chunk of clinker. Over thousands of years, the action of water, wind and plants will slowly break down the formation.

As you explore the park, look for further evidence of how fire, water and wind have each played a role in shaping the badlands' "desolate and grim beauty" so admired by Theodore Roosevelt.

You may take this leaflet with you or return it to the dispenser.